PATENT SPECIFICATION

752,448

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Date of application and filing Complete Specification: December 13, 1954

No. 35990/54

Complete Specification Published: July 11, 1956

Index at acceptance:—**Classes 9(1)**, A2D; **83(2)**, A129; **and 83(4)**, H5C.

COMPLETE SPECIFICATION

Improvements relating to Projectiles

We, AKTIEBOLAGET BOFORS, a Swedish Company, of Bofors, Sweden, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to projectiles of the kind comprising a case containing a projectile core.

Projectiles of this kind are usually assembled to form a unitary structure together with a driving disc and a guide ring, and function as reduced-calibre projectiles. They are usually called sabot projectiles. Several types of such projectiles have the core enclosed by a case consisting of two parts each closed at one end and which are assembled over the projectile core from the ends such that the open ends of the parts overlap each other, the overlapping ends being then secured together, *e.g.* by centre punching. In cases of this kind, projectile cores of tungsten carbide have been found to exhibit little resistance to bending and to shocks, since the projectile core can move in relation to the case.

The object of the present invention is to provide a projectile comprising a case containing a projectile core, which case is so formed that the projectile core can safely be subjected to greater bending stresses and will have better resistance to shocks.

A projectile according to the invention, comprising a case containing a projectile core of a material, preferably tungsten carbide, which is more brittle than the material of the case, which is preferably made of steel, is characterised by the projectile core being so embraced by the case that during assembly the case is placed under pronounced longitudinal and/or radial tension and the projectile core after assembly is subjected by the case to pronounced longitudinal and/or lateral pressure whereby its resistance to binding stresses and shocks is greatly increased.

One form of projectile according to the invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 shows the projectile located in a die, just before its end is closed, and

Figure 2 shows the finished projectile.

In Figure 1, the numeral 1 designates an annular die the internal face of which is cylindrical the greater part of its height but comprises an upper portion increasing in diameter towards the top. The die receives a case 2 the central part of which is more or less cylindrical and the open end of which increases in outside diameter and rests against the enlarged upper portion of the internal face of the die 1. A cushion 3 for example of aluminium or other similar material is inserted into the case while it is in this position. A projectile core 4 for example of tungsten carbide is then inserted into the case by means of a pressure member 5 acting upon the end surface of the core 4 through a disc-like closure member 6 having a chamfered edge as illustrated and a coaxial cylindrical projection 7 received in a hole in the pressure member 5. The pressure member brings the projectile core into the position shown in Figure 1, where the core rests against the cushion 3 and the upper end surface of the closure member 6 is more or less level with the end surface of the case 2. Downward movement of the pressure member 5 is continued and the wall of the case subjected to tension as the case and the projectile core are moved downwards. During this downward movement, the end part of the case which, in the position shown, extends laterally beyond its central part is pressed inwards by the die 1, whereby such end part engages behind the closure member 6 as shown in Figure 2. When the case with the projectile core has passed through the die 1, it is allowed to fall on to a suitable conveyor belt. In the finished projectile, as shown in Figure 2, the case is in tension in the direction of its longitudinal axis.

The case can be given a smaller inside diameter than the outside diameter of the projectile core along the major portion of its length and, with the exception of the rear portion which should have an inside diameter which at least is not less than the outside diameter of the projectile core the case

will then also be under radial tension.

In the assembled projectile the case is under stress both longitudinally and radially and transmits similar stresses to the projectile core whereby its resistance against shocks arising through movement of the projectile in relation to the case, and its resistance against bending stresses, will be increased.

A projectile according to the present invention has the advantage that, at impact, axial compression and consequently rupture of the case is delayed since the compressing forces must first compensate the tensional forces in the case.

The stresses in the case can be increased by using a preheated case whereby it shrinks on cooling after assembly.

In the specification of our co-pending Application for Letters Patent No. 35,992 of 1954 (Serial No. 752,067) we have claimed a projectile consisting of a case and a core, preferably of tungsten carbide, contained in the case, wherein the case is provided with a circumferential line of weakness so that on impact of the projectile the case is separated into two parts.

What we claim is:—

1. A projectile comprising a case containing a projectile core made of a material, preferably tungsten carbide, which is more brittle than the material of the case, which is preferably made of steel, wherein the projectile core is so embraced by the case that during assembly the case is placed under pronounced longitudinal and/or radial tension and the projectile core after assembly is subjected by the case to pronounced longitudinal and/or lateral pressure whereby its resistance to bending stresses and shocks is greatly increased.

2. A projectile according to Claim 1, wherein the end portion of the case is wholly or partly closed over the rear end of the core.

3. A projectile according to Claim 2, wherein a closure member is disposed between said end portion of the case and the rear surface of the core to transmit forces between case and core.

4. A method of manufacturing a projectile according to Claim 1, comprising placing a case having an outer diameter at its rear end exceeding that of the rest of the case such as to be surrounded by a die having a through hole with a diameter smaller than the first-mentioned outer diameter, inserting a projectile core into the case until the front end of the core rests directly or indirectly against the front inner end of the case, and giving the core a further movement in the same direction to move the case forward in the die whereby the end portion of the case is swaged inwardly by the die to engage directly or indirectly behind the rear end of the core.

5. The method according to Claim 4, wherein the inside diameter of the case at its rear end is not less than the outer diameter of the projectile core, and the inside diameter of the remainder of the case is less than the outside diameter of the core.

6. The method according to Claim 4 or to Claim 5, wherein a closure member is placed on the rear end of the core before giving the core said further movement.

7. A method of manufacturing a projectile substantially as herein described with reference to the accompanying drawings.

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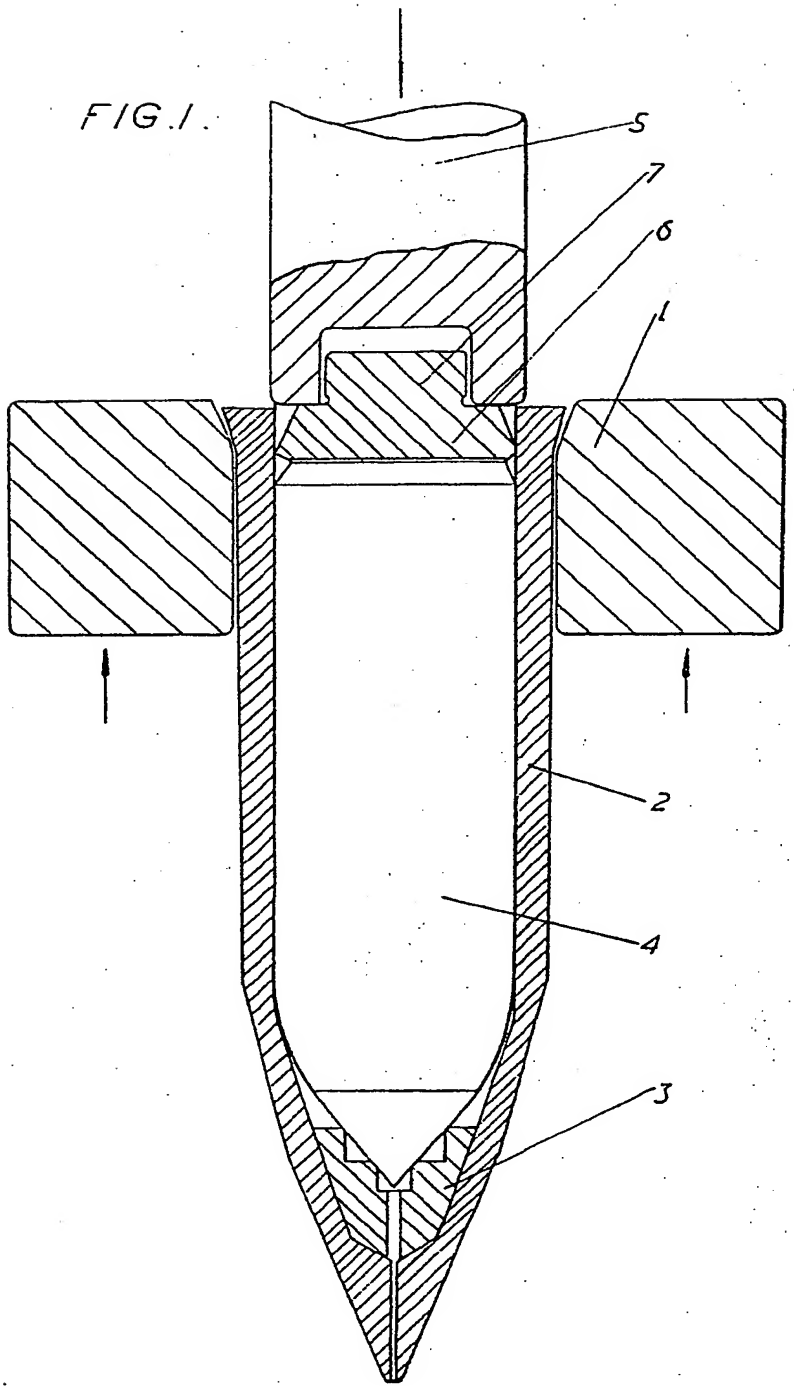
Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press.—1956.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

FIG. 1.



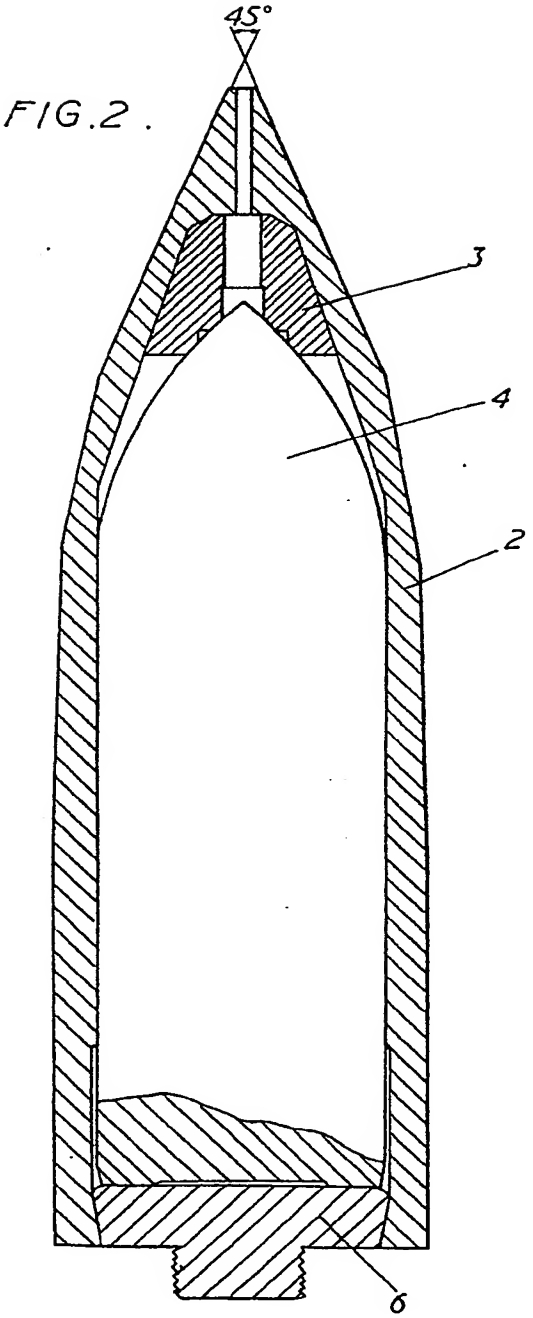
752,448 COMPLETE SPECIFICATION

2 SHEETS

This drawing is a reproduction of the Original on a reduced scale.

SHEETS 1 & 2

FIG.2.



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SHEETS 1 & 2

FIG.1

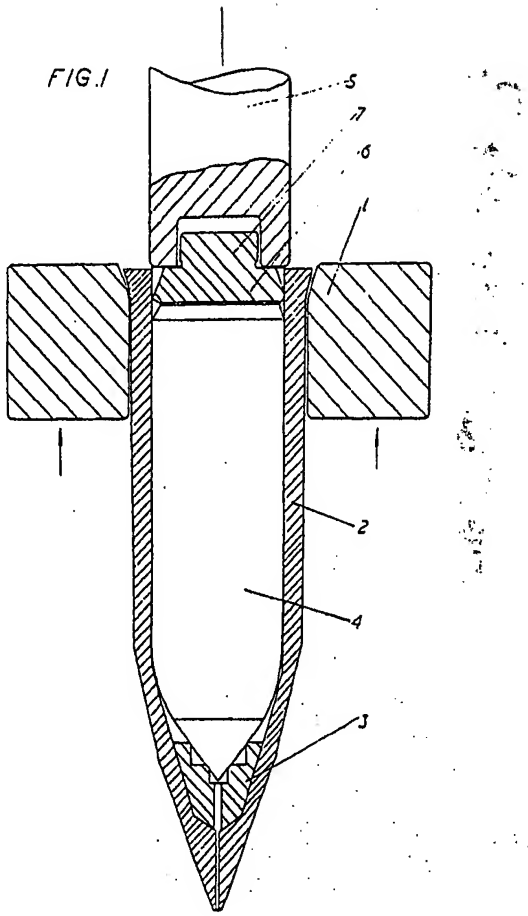

FIG.2.